Fabrication and Characterization of Proton Conducting Phosphate Electrolytes for Intermediate Temperature Fuel Cell Assembling

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Outline

The worldwide development of fuel cells and electrolysers has so far almost exclusively addressed either the low temperature window (20 - 200 °C) or the high temperature window (600 - 1000 °C). The intermediate temperature window enables the possibility of combining advantages from low and high temperature technologies. Fast electrode kinetics and material stability are key parameters. However, in the intermediate temperature interval there are no proton conductors working satisfactorily. The finding of such electrolytes is an ultimate goal of solid electrolyte research. [1]

Certain proton conducting materials are plastic in nature e.g. CsH_2PO_4, whereas others are not e.g. $NdPO_4$. By combining the materials in a ceramic composite with at least one other component, it is possible that suitable mechanical properties can be reached.

In former work, proton conduction has been demonstrated for ceramic $NdPO_4$-CsH_2PO_4 composites using EIS. [2][3]
Based on the novel ceramic composite a hydrogen cell and hydrogen-air fuel cells has been constructed and operated. Under these conditions proton conduction was confirmed by EMF and thermal stability in fuel cell conditions was confirmed by OCV.

Acknowledgement

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[1] T. Norby. NATURE| VOL410|19APRIL2001 s. 877-87
[2] A. H. Jensen, 3rd CARISMA International Conference on Medium and High Temperature PEM Fuel Cells, Copenhagen, 3 – 5 September 2012, 60 – Poster session
[3] T. Anfimova, 3rd CARISMA International Conference on Medium and High Temperature PEM Fuel Cells, Copenhagen, 3 – 5 September 2012, 65 – Poster session